ARCHITECTVRE

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PLATES AND ILLUSTRATIONS.

PROFESSIONAL COMMENT.

THE most important work accomplished at the recent convention of the American Institute of Architects at Washington was the readjustment of the classes of membership. In future all candidates will be elected to the local body as associates, from which they may graduate into the National body, which at the same time will confer full membership in the Chapter. The present members of local Chapters, who are not members of the National body, cannot, of course, have any of their constitutional rights abridged, but this class of members will naturally die out in time, as no new men will be admitted under the old conditions. It was the purpose of the New York Chapter in instructing its delegates to make these propositions, that Chapter members who were not members of the Institute, should become associates, although they should lose no actual rights, and notwithstanding that some few of the members of the Chapter protested against this system, by which they would be degraded even in name, the Chapter insisted that their intentions should be carried out, as far as the local delegates could bring the matter to a head. The National body, however, did not agree to this proposition. This Convention of the America Institute of Architects was held in Washington during the week ending January 12th and reports were presented by committees as follows: House, Glenn Brown, chairman; Education, Ralph Adams Cram; Foreign Correspondence, Glenn Brown, chairman; Contracts and Lien Laws, Alfred Stone; Applied Arts and Sciences, Irving K. Pond, chairman. On the evening of the 8th, at a reception at the Corcoran Art Galleries, the gold medal of the Insitute was conferred on Sir Aston Webb and the British Government was represented at the ceremony by Mr. William Esme Howard. On Wednesday, the exercises commemorative of the founding of the Institute were held at the New Willard and many of the older members delivered reminiscent addresses and later at the "Octagon," the delegates attended a reception, when a tablet was unveiled in honor of the founders and an exhibition was held of the works of Sir Aston Webb, followed by the annual dinner, at the New Willard. The following named officers were elected for the year: President, Frank Miles Day, Philadelphia; Vice-President, William Bryce Mundie, Chicago; Secretary and Treasurer, Glenn Brown, Washington. Although the fact did not develop very strongly during the proceedings, it was apparent to any one who watched the current of events, that there was considerable irritation between the Eastern and Western members. The constitution does not limit the number of directors who may be appointed from one Chapter, and although there were formerly five men on the Board from the New York Chapter, whereof there are now but two, the Western men still feel that the control is too much in the East.

AFTER a long delay the Building Committee of the Board of Aldermen, of which Alderman Grifinhagen is chairman, has announced the committee of experts for revising the Building Code of New York City, provided by the resolution passed last summer. The names of the appointees are as follows: Architects—Charles H. Israels, of the firm of Israels & Harder; Electus D. Litchfield, of Lord & Hewlett. Structural Engineer—Rudolph E. Miller. Sanitary Engineer—Charles O. Brown. Builders—George Vassar, Jr.; Theodore Starrett. Mechanics—George Harsch; Thomas F. Cosgrove. Engineer—Charles G. Smith, representing the Fire Underwriters. Attorney to the Commission—William Blau. The two architects were selected from a list of five presented by the New York Chapter. Mr. Rudolph E. Miller was the chief engineer of the Bureau of Buildings for some ten years and is certainly better qualified than any other man of his profession in New York for this position. Mr. Charles O. Brown has a high reputation as a sanitary engineer, while Messrs. Vassar and Starrett have had a large experience in the construction of tall buildings. Fortunately the speculative element is entirely absent from the personel of the the commission, which is one that should be entirely free from political influence, and which, we believe, can be depended upon to evolve an up-to-date Code, which will be consistent with the best methods of construction in vogue at this date. We under-

Architects of To-Day.

MR. JULIUS FRANKE, NEW YORK.

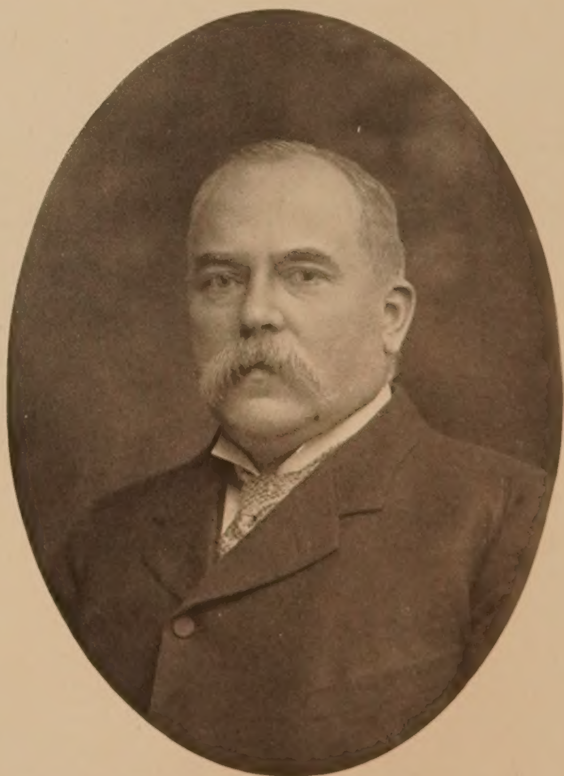
stand that the Charity Organization Society and other associations will make an effort to have the height of buildings limited in the new Code, and undoubtedly the Commission will be overwhelmed with recommendations from interested parties, from which they will have to select the best with exceeding care, if they are to prepare a law free from bias.

THE extent to which New York City is becoming a city of apartments, is well illustrated by the statistics, showing the small number of private dwellings built in the various boroughs during the last three years. In the Borough of Manhattan in 1904 but eighty-four dwellings, costing $2,674,500 were built; in 1905 this was increased to one hundred and four, costing over $4,000,000 and in 1906 again it fell to fifty-five, at the cost of $2,200,000. The statistics in the other boroughs show private houses up in the thousands, but it should be remembered that many of these buildings are two-family houses, which while dwellings under the law, are usually not so considered. The cost of these dwellings, as given in the statistics, is undoubtedly misleading, as usual, as it is unfortunately very rare for the correct cost to be given upon the applications made for a permit, and as long as the tax authorities continue to take these figures without further appraisement, the owner who expects to occupy his house, will put the price low, while the speculator will put it high.

A BILL which was recently introduced at Albany by Assemblyman Cuvillier will be a great shock to some of the speculative builder's methods, if it is put through. This bill makes it unlawful for a landlord to increase the rent of any store, dwelling house, apartment, or flat in the first year of occupancy of the tenant. It has been the custom for many years for speculators to fill their new houses at high rents, by inducing the tenants to move in by giving them several months free rent. In presenting the schedule of rents to the prospective buyer, it is easy to show by figuring the schedule on a monthly basis, that the annual rent roll is far larger than it actually is. Immediately upon purchasing, the new buyer, who finds out the situation, in order to square himself with his prospective income, is compelled to raise the rents all around.

ALL of us who remember the beautiful exhibitions given in previous years by the National Sculpture Society, will be glad to hear that its efforts are to be repeated next autumn at the Fine Arts Building in Fifty-seventh Street, where it has been decided to hold an exhibition and to prepare the small rooms after the manner of a formal garden, which is to be designed by Mr. Thomas Hastings, while the Vanderbilt gallery will be preserved for the Salon proper, which will be treated in the period of Louis XVI. The Sculpture Society's own rooms will be used for an exhibition in drawings and models prepared by the City Improvement Commission. The idea of the Committee is to take up a certain section of the city as it now is and make a concrete plan of beautification, including such as may be obtained by judicious planting of foliage.

Beginning on May 4 next, the Grand Central Palace will be occupied by the Home Builders Exhibition, which will be the first of its kind held in this country. Its scope will include every raw and manufactured product that can be introduced into the construction of the modern dwelling, with



Architects of To-Day.

MR. ROBERT MAYNICKE, NEW YORK.

all of its adjuncts and surroundings, but not articles of ordinary character, which possess no special feature of novelty, utility, or originality. The exhibition will attempt to include every conceivable improvement that American genius has designed or invented, for the enhancement of home comfort, economy and usefulness.

The show is backed largely by the real estate interests of Long Island, and it seems to us that the most important contribution that the architect could make to the improvement of these outlying sections would be in developing street plans for the numerous centres of population, which are now being founded on the other side of the East River. It is only necessary to hold up our own city as a horrible example of what can be accomplished by the endless rectangular plans and the architect should be able to demonstrate that a plan laid out on more artistic lines, has so large an economic value that the real estate speculator would be bound to accept it, by reason of the increased profit, which he would obtain by the larger number of corner lots.

ALTHOUGH the upper part of New York City shows almost every conceivable bad feature due to the rectangular plan, it might have been made worse. It is a fact known to very few New Yorkers that April 3 next will be the one hundredth anniversary of the creation of the Commission by Special Act of the Assembly, which planned the streets of Manhattan above Astor Place. Gouverneur Morris, Simeon DeWitt, and John Rutherford were the gentlemen who were responsible for our present difficulties and they even considered the proposition of eliminating the old Bloomingdale road, which practically corresponds to our present Broadway, as it interfered with their conception of a city of perfect rectangles, which to them seemed the perfect city. What New York would have been without Broadway can be seen by the map prepared by William Bridges, the City Surveyor, which appears in one of Valentine's Manuals, and a copy of which is hanging on the walls of the Hotel Astor. The story is told of these commissioners that while walking about, discussing their proposed plan and trying to explain their ideas, one of them stopped in front of a building under construction, where a laborer was sifting sand. One of the commissioners attempted to illustrate his scheme of rectangles by drawing in the sand with his cane, when suddenly the sun appeared and threw the shadow of the sieve on the sand, at which the gentleman ceased and announced that that was exactly what he wanted, and to this unfortunate circumstance we no doubt owe the fact that we have few avenues running the long way of the city and a large number of streets running the narrow way. Whatever may have been the deficiency of this commission as to the artistic needs of New York, they certainly had a very prophetic vision of the wonderful growth of population, for they say in their report in defending the large area, which they have planned:

"To some it may seem a matter of surprise that the whole Island of Manhattan has not been laid out as a city. To others it may seem a subject of merriment that the Commissioners have provided space for a greater population than is collected at any spot on this side of China. * * * It is not improbable that considerable numbers may be collected at Harlem before the high hills to the southward of it shall be built upon as a city, and it is improbable that for centuries to come the ground north of Harlem Flats will be covered by houses. To have come short of the extent laid out it might therefore have defeated just expectations, while to have gone further might have furnished materials to the pernicious spirit of speculation."

THE Municipal Art Commission has had a busy time during the past year considering the improvements which called for the laying out of some $27,000,000 on behalf of the city, excluding the school houses erected by the Board of Education. Among many of the larger works which they have authorized, is the new Bellevue Hospital, costing $1,500,000; a public bath at East Fifty-fourth Street, costing $100,000; about a dozen buildings for the Home of the Aged and Infirm on Blackwell's Island, costing various sums from $10,000 to $150,000 each; plans involving the cost of $1,500,000 for the Queens County approach to the Blackwell's Island Bridge; the extension to the American Museum of Natural History, costing $250,000; a new building for the Health Department in Brooklyn for $200,000; the immense work for the Staten Island Tuberculosis Hospital, which is to cost nearly $2,000,000; the new ferry terminals at Whitehall Street and Staten Island, $1,500,000; and the Chelsea improvement along the North River, south of Twenty-second Street, which will cost when completed, $8,000,000.

IT has often been suggested by architects, who have opposed the present tenement classification of New York City, and who have thought it unfair that high class as well as low class houses should come under the same law, that a differentiation might be properly made on the basis of rent paid. The recent experience of the London County Council seems to show that this theory will not work. On account of the great immigration into London, large sections of the city heretofore devoted to high class houses have been occupied by the tenement population. Under the Public Health Act of 1891, the definition of a tenement is based on rent and the Public Health Committee now finds that although the total number of tenements in London of less than five rooms is 672,000, only 16,433 houses let in lodgings are registered. This is accounted for by the fact that houses in which tenements are let above the limit are exempt from the application of such laws.

REFERRING to the paragraph under "Professional Comment" in the January number of ARCHITECTURE, concerning the Competition for the State Education Building at Albany, the following is the complete list of the ten Architects selected to submit designs in the final competition: Allen & Collens, Boston; Martin C. Miller and Walter P. R. Pember, Buffalo; Pell & Corbett, New York; George Cary, Buffalo; Palmer & Hornbostel, New York; Wells & Hathaway, Boston; Hedman & Schoen and Goodwin & Jacoby, New York; J. H. Freedlander, New York; Howells & Stokes, New York; P. Thornton Marye and Frederic W. Brown and A. Ten Eyck Brown, Washington.

On the evening of February 20, Mr. Grenville T. Snelling will lecture at the Architectural League, his subject being, "A Talk on Reinforced Concrete Construction."

CATALOGUES WANTED.

Mr. Samuel Gross and Mr. Joseph Kleinberger have formed a partnership for the practice of architecture, with offices at Bible House, New York. They will be pleased to receive catalogues and other advertising matter.

LIVING ROOM, COUNTRY HOUSE, R. E. FOREST, CEDARHURST, L. I. (See plate XI) Ewing & Chappell, Architects.

WATERPROOFING, PARTICULARLY AS APPLICABLE TO MASONRY AND CONCRETE STRUCTURES.*

Edward W. DeKnight.

MOISTURE holds the world in its power. Of all forces it is the greatest—the most pervading, insidious, ceaseless, mysterious, creative, destructive.

The opposite of moisture is heat. Between the two revolve all the forces and things in nature. Man has yet to learn the secret of perfect insulation against one and protection against the other.

Moisture generates heat and, in the generic sense, there is no heat without moisture.

Iron is one of the most important and the most abundantly distributed chemical elements in nature—purposely so, if we may so put it.

Iron has a wonderful affinity for moisture which it will draw through many feet of rock and soil and, eventually, deep down into subterranean rivers, lakes and seas, of fresh or salt, hard or mineral, cold or boiling water, which in its further course of percolating through the earth's varied strata, originates chemical action—heat, ignition, combustion—the expanding, pent up steam and gases finally bursting forth in a volcanic eruption.

The laws of nature are inexorable, and always remain the same no matter in what new form they may be expressed. In the pride and glamour of our marvelous artificialities we sometimes get so far away from natural law or first principles that we must go back to locate ourselves, as it were, and start anew.

For instance, in taking sand, stone, lime, cement—all earthy matter—and forming them into a hydrated material, to which we then add iron, we are simply forming a typical geological stratum. All the elements therein (particularly the steel) having, in a greater or less degree, a strong affinity for moisture.

We incorporate the steel to strengthen the cement, or the cement to protect the steel, but fail to take the next step forward and protect the cement. What is the natural result? Moisture is readily absorbed by the cement, either by capillarity or through cracks, while the greater affinity of the steel alone would, and does, of itself, draw moisture through two feet of cement. The moisture in passing through the cement takes up certain salts injurious to the steel. When the moisture reaches the steel, chemical action ensues—heat is generated through decomposition or corrosion, the pent-up gas (liberated hydrogen) escaping by bursting off a brown, infinitesimal, volcanic cone—which we call rust.

And thus we have expressed, only in a different way, the same changeless natural law underlying the volcanic eruption. We are at the exact point in the circle whence we started, only, spiral-like, a little higher up. In both cases, *i. e.*, in the earth and the cement, the iron is imbedded and out of sight, and no one knows what degree of change in it has happened. We do know, by the natural law, that *some* change *is* occuring to the steel imbedded in the cement.

*Paper read before the Western Society of Engineers, Chicago, Nov. 21, 1906, by Edward W. De Knight, Manager, Hydrex Felt & Engineering Co., New York.

We know that steel, imbedded in cement and kept *dry*, will indefinitely retain its purity and strength. We know also that moisture, reaching the steel, creates corrosion. The immediate effect is to destroy the bond between the steel and the concrete—the heat and expanding gas from decomposition (which is progressive) pressing the cement *away* from the steel—and there then no longer exists, in fact, steel-reinforced concrete, but the very opposite, and a menace to life and property, which may eventually end in a collapse. If there is a particle of iron in the plaster on the ceiling and walls of this room it will make itself apparent by a brownish raised spot or scale as the result of moisture in the air attracted by and decomposing the iron.

It is said that no one with an imagination will commit a crime. It seems incredulous that any one with an imagination would add to cement or concrete in the mixing, salt, iron, slag or cinders. *Moisture* percolating through cinder-concrete will form what is commonly termed lye, which will soon eat through any steel wire, rod or girder. Yet because of its lightness, but without regard to its chemical fitness, cinder concrete is extensively used for floors—the very part of a structure most apt to collapse. Waterproofing concrete floors is a rarity on the assumption that they are sufficiently watertight. Possibly so, but it is not the quantity of water which flows over or evaporates from the floor surface, but the small quantity which from time to time reaches below the surface where it remains longer than elsewhere and, unseen, is decaying the imbedded steel.

Waterproofing arches is still widely looked upon as a wasteful expenditure, while the waterproofing of the masonry or concrete encasing the steel columns of our tall office buildings is considered the essence of refinement.

Steel-reinforced concrete is yet but an experiment. Nor do we know the life of the modern steel office structure. One thing is *sure*, that the security and life of its steel skeleton depends upon how far the columns supporting the structure are at their *base* rotting from electrolysis or moisture. We do not know, because we do not see, but that they *are* decaying is true. While painting *exposed* steel tends to protect it, paint prevents the bonding of the steel and cement. The life of a masonry structure is indefinite. Imbedding steel in concrete or masonry, however, may or may not be dangerous. It is certainly safer that *steel be* always open to observation and minute inspection as, for instance, on a bridge. As gangrene in the flesh or bone will kill the living organism, so will diseased, decaying steel tend to eventually destroy the cement in which it is incorporated. Evidence in this direction is abundant if we can stop long enough in our rush to accomplish things, to carefully consider it.

In the proceedings of the 28th Annual Convention of the American Institute of Architects, 1904, in a discussion regarding steel cage construction, Mr. Geo. B. Post, the distinguished architect, said:

"I want to say one or two words more. I meant the statement in the outset in regard to steel cage construction and its durability, not to a possible construction made with the greatest possible care, but to construction as I have seen it going up in the city of New York during the last two years, where the iron columns were given a very light coat of paint, very little attempt made to protect the joints. I presume that the great mass of joints will remain for a great period perfectly sound and safe, but the several hundred bearing joints in a building put up without any great care, put up, it seems to me, with a good deal of recklessness in a great many cases, with no protection except eight inches of ordinary brick work, I don't believe they will stand for any serious length of time, with perfect safety. I don't know if you gentlemen have had the experience with brick walls

DINING ROOM, COUNTRY HOUSE, R. E. FOREST, CEDARHURST, L. I. (See plate XI) Ewing & Chappell, Architects.

COMPETITIVE DESIGN, TRAVERS ISLAND CLUB HOUSE, N. Y. A. C. Edw. Pearce Casey, Arthur Dillon and Arthur Durant Sneden, Architects.

that I have. I have seen the water in a northeast storm in the city of New York go through a four-foot brick wall and run down on the inside of its surface as though there was nothing there—a wall 150 feet high, exposed to a northeast gale, the water went through the four-foot wall at the second story and run down on the inside, the wall being unpainted. The condition of a beam encased in cement and in a foundation is a very poor guide for what will occur in a joint on a flat, exposed wall with only four to eight inches of unpainted masonry. Every time that a storm comes that brick work becomes soaked with water, and will remain soaked for a considerable time. I should not hesitate, individually, using great care, to put up steel cage construction of any height, but I think that it is a matter in which we should be exceedingly careful, and I do not believe that the construction of a great many buildings which I have seen go up, is of a character which will stand any longer than the beams which I took from the first tier of the Times Building when I made the alterations. The ceiling was 20 feet high; there was running machinery in it; it was dry, clean and well kept. There was no apparent moisture, but many of the wrought iron beams in the ceiling had, as I say, entirely lost their integrity and strength. I don't think if they had had steel or cast iron beams that the result would have been the same, but unless the greatest care is taken to prevent corrosion of the metal, there will be trouble."

In further and stronger evidence, there is submitted the following extract from a very recent report (dated Sept. 11, 1906) to the Structural Association of San Francisco by a committee appointed to make an examination of certain cases of corrosion of metal in cinder-concrete floors:

"The cinder concrete is somewhat porous with occasional voids and also contains coal from dust up to lumps ¾-in. diameter. Rust spots occur in the concrete and where such spots are in contact with the metal, the corrosion is severe. The rust spots are sometimes an inch across, quite soft and easily removed by the finger nail. Occasional splinters of wood occur in the concrete, which shows that the heat was not severe as the wood is not charred. From the position of the floors it is certain that no water has reached the concrete since April 18, and that the corrosion was prior to the fire, but it appears to be more marked where floors have been exposed to rains since the fire. The corrosion is irregular in amount. In some cases the expanded metal is only slightly rusted, and in places it is entirely destroyed, several places were noticed where a small semi-circular patch had been removed from the edge of a metal strip; also at times it crossed the surface of the strip in a line, which suggested that it followed a surface crack in the metal. There seemed to be a tendency to corrosion at certain points in the diamond mesh, which would indicate that the metal had been strained in the process of setting and expanding, but there is not positive proof of this.

The extent of the corrosion is great enough to seriously endanger the safety of the floors, and it is not probable that the floors would have supported their loads more than one to three years longer."

The committee recommended that their Association try to have the building laws amended, so as to exclude the use of cinder-concrete in floor slabs or for fireproofing. The protection of the floor from moisture or water, however, seems never to have occurred to the committee.

We do not want to get away from the initial point in this paper, namely, that in the formation of steel-reinforced concrete, we are simply transferring certain chemical elements with no change in principle, and must needs go a step further.

The suggestion occurs, therefore, that we must treat the new form of the structure as we would a living thing—a thing that moves—if we expect that particular thing to long be of *safe* service; otherwise we revert back to the crudity of the same first principle linking the eruption of the volcano with the formation of rust. So considered, therefore, is or is not steel a menace to concrete?

We need not dig deep into chemistry or physics to sub-

stantiate the facts. We need only take the overt fact—the evidence of our eyes—based on common sense.

If *moisture* is the thing, as it undoubtedly is, then *moisture is the thing to be counteracted*. Therein lies the prevention. The real importance of waterproofing, therefore, is not simply in keeping water out of buildings, but in its protecting and preserving the steel. It then behooves us to ascertain what development has been made in waterproofing masonry and concrete structures and what seems to be best in the prevailing practice.

All efforts in the waterproofing of structural work are divided into two main, totally dissimilar lines, *i. e.*:

1st. Treating concrete to make it, in itself, impermeable.

2nd. Protecting concrete or masonry with something *apart* therefrom to waterproof them.

In other words, shall water reach the concrete, or shall it not reach the concrete?

Before adopting any basis of waterproofing practice, we must decide which of the two divisions is right. We will consider them separately.

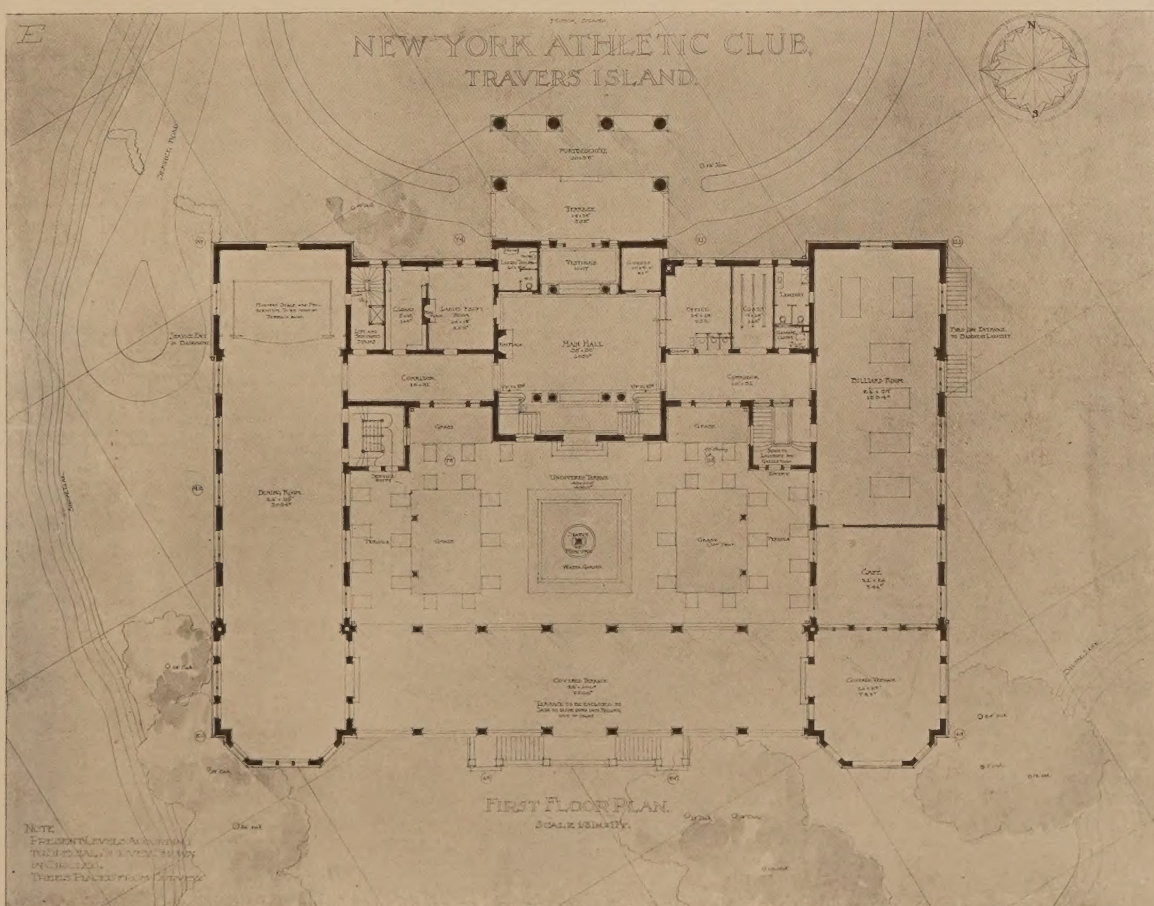
TREATING CONCRETE TO MAKE IT, IN ITSELF, IMPERMEABLE.

Under this head come those materials and methods for making concrete impermeable. First, by mixing certain chemicals with the concrete for the purpose of making the solid mass impermeable; and, second, by applying a coating or wash to the hardened surface of the concrete, or applying thereto a cement plaster. The ingredients generally used are lime, silicate, soda, lye, soap, alum, etc., etc.

Among many objections to the first process is, that the mixing of the chemicals with the cement will not lessen the present general difficulty of having concrete properly mixed in the field. Without, or with, the chemicals, therefore, there will always exist zones weak in quality and density. Another objection is the uncertain effect the addition of the chemicals will have in time upon the concrete, and particularly upon the imbedded steel.

One of the chief, among numerous, objections to the second method, *i. e.*, using coatings or washes, is the poor judgment in basing dependence for permanent waterproofing upon *one* thickness or layer of any single thing, which in this case happens to be a wash almost imperceptible in its thinness. This, aside from any consideration of the fact that but one infinitesimal pore imperfectly closed, by permitting the entrance of water—which would soon spread—would make valueless the balance of the washed surface. Such treatment is not even consistent with the doctrine of *similia similibus curantur* because we are not curing like with like, but adding a bad thing to a bad thing.

Most seriously, however, neither of these methods make any provision whatever for the cracking of concrete, which is entirely overlooked. That concrete *will* crack is indisputable. That it can be made impermeable is possible. Why, however, make it impermeable if its impermeability will not



COMPETITIVE PLAN, TRAVERS ISLAND CLUB HOUSE, N. Y. A. C. Edw. Pearce Casey, Arthur Dillon and Arthur Durant Sneden, Architects.

prevent cracking, or provide waterproofness for practical, every-day conditions? Are not, then, the extensive laboratory tests as to the waterproofness of briquettes and water-filled boxes of cement, or tubes filled with water, whether under 10 or 50 foot pressure resting on blocks and cubes of specially treated cement, an expenditure of time and energy in the wrong direction, at least from the viewpoint of practical waterproofing? Would it not be impossible to extend into monolitic form in the field, concrete so perfect in texture and mixture as the specially prepared laboratory sample? Masses of concrete in the open, especially in this climate where the temperature ranges over 120° F., are subject to inequalities of settlement, contraction and expansion, and other conditions impossible, to the same degree, in a laboratory sample. Testing the strength and quality of cement, as cement, is a different thing.

We have seen water drawn up fifteen or twenty feet by concrete. We have also seen water percolate through concrete over 20 feet thick. It may take two or three years to do so; meanwhile the assumption is that the concrete is fairly watertight; but with the average concrete, water will come through it *in time*. When the concrete thus becomes damp, wet and saturated with moisture, it is impossible to get the moisture out. If the moisture freezes—expanding ten times its volume in so doing—it requires no stretch of imagination to calculate the effect upon the concrete or masonry. Enough water will be taken in through a crack *before the crack is filled* to attack and injure the steel. Filling the crack after that is simply patching without curing.

It has often been, not facetiously, but seriously, suggested that all that is needed to solve the difficulty is for some one to invent something to fill the cracks and make a watertight joint, with special reference to structures above ground level. The U. S. Patent Office will not entertain an application for patent on an invention claiming perpetual motion, on the assumption that there is no such thing in mechanics. A perpetual crack filler whch will make a crack watertight under a temperature of 120° F. in August, and 20° F. below zero in January, is beyond the pale of possibility—or even perpetual motion.

After due consideration, therefore, does it not seem absolutely necessary that we get *away* from the concrete, and provide something to so protect it that water will *not* reach the concrete, whether it cracks or not?

PROTECTING CONCRETE WITH SOMETHING APART THEREFROM, TO MAKE IT WATERPROOF.

Under this head come those materials and methods for preventing water from coming in contact with the concrete.

Practically the first efforts in this direction were to coat the surface to be waterproofed with hot coal-tar-pitch or asphalt, which, however, when set and cold, cracked and separated with any settling or cracking of the masonry. Burlap was subsequently used to reinforced the pitch or asphalt, without, however, preventing them from cracking and the burlap, being of itself not waterproof, did not give waterproofness. Later on, there came into use for this purpose tar paper, which, however, lacks pliability and tensile strength. Tar and tar paper have been extensively used for waterproofing in the past, simply because there was nothing else open to the profession. It was not until recent years that any serious effort was made to place waterproofing on a scientific basis, and to make materials specially adapted to the various conditions—materials which would not become brittle or be injuriously acted upon by water, the salts in the earth, alkali in cement, etc. The result of this specialization has been to greatly improve methods and to open to the profession products for difficult work and special conditions, considerably in advance of old-school materials.

There are also used for waterproofing mastics composed of coal-tar-pitch, or asphalt, mixed with sand or torpedo gravel, resembling somewhat, when finished, an asphalt pavement. Mastics on floors, especially on bridge floors where there is consiberable vibration, soon separate from walls, steel columns, and girders. If the mastic is made soft enough so as not to crack in winter, it becomes too soft to bear the load of traffic in the summer. The chief objection to mastics is that they crack clear through with any contraction and expansion, or cracking of the masonry or concrete surface, of which they become an integral part when applied hot thereon.

Specifications also frequently require that the interior surfaces of foundation walls and floors shall be given one or two coats of some waterproofing paint. The paints might be excellent materials in themselves, but their use for such a purpose is a sheer waste of time and money, as they cannot possibly prevent, for a number of obvious reasons, the percolation of water through the wall, or protect the imbedded steel. There are also now on the market a number of what are termed "textile" waterproofing materials, which, on examination, will be found composed, in many instances, of simply burlap, *i. e.*, ordinary commercial bagging. The fibre is vegetable, is extracted from the bark of trees, and is very perishable, especially in underground conditions. The apparent strength of such materials misleads one into using them, whereas strength *alone* is not, by any means, the first essential in a waterproofing material. These saturated textiles or baggings are, in a measure, going backward to the old-school method of incorporating burlap with pitch or asphalt, to reinforce it as steel reinforces concrete. There is a clear distinction, however, between the principle and results to be obtained in reinforcing concrete with steel, and reinforcing waterproofing with burlapped textiles. The two should not be confounded. Otherwise it would be advisable to reinforce the bitumen with copper mesh. The treated or saturated burlap is no more waterproof, especially for *waterpressure* work, than when originally used to hold pitch or asphalt on a wall. This can be easily tested by placing a single sheet or thickness of the treated material under the slightest waterpressure, when it will be found, within a few hours or days, that water easily passes through the interstices of the material. A woven fabric has never proved superior for waterproofing, even though it be canvas, because the fibres pull against, instead of with, each other, resulting in the opening of the interstices and the usual splitting of the fabric.

The best material is unquestionably a strong, fibrous felt, made in itself, *i. e.*, in one sheet, absolutely *impervious to water* by a process of saturation and coating with materials specially adapted to withstand the injurious action of water, and particularly all underground conditions. It is, then, practically an impervious membrane or skin through which, of course, in one sheet, water will not pass. As many layers thereof, as the conditions require, can be then cemented or veneered togther with a waterproof bitumen-

cement, not too weak, or hard and brittle, for the felt, but as strong and elastic as the felt. This forms a waterproof stratum so strong, tough and pliable, that, without injury, it can be readily pulled, bent, turned, twisted, etc. Whether in a building foundation, covering the floor of a bridge, or enveloping a tunnel, it readily conforms to the final conformation of the surface waterproofed, of which it is practically a part, and which it insulates and protects under all conditions—settlement, jars, shocks, cracks, expansion, contraction, heat, snow, ice, water, etc., etc.

The speaker has termed this *"the membrane method,"* and firmly believes it the basis for the development of a perfect waterproofing.

We previously advanced the theory that our structures should be treated, in the waterproofing sense, as things that live., *i. e.*, things that move. We would again, therefore, go back to locate some first principle of natural law as a guidance, because there is nothing made by man, that its prototype in some form is not somewhere in nature. No man ever invented a color. No man ever devised an insulation for the most intricate electrical machinery as perfect as the insulation of the human brain—the dynamo of the universe.

In seeking a guide, therefore, in our present problem, we find throughout nature no waterproofing which is *hard*, or set, or vitreous—because nature waterproofs only living things (things that move)—not dead ones, or inorganic ones, which do not require it, but, by moisture, heat, and decomposition are resolved back into carbonate of lime. Therefore, all things that live and *move* require, and are by necessity protected with, a flexible, *elastic* skin, yielding to growth, movement, action. Therein lies the origin, the first principle of waterproofing, natural or artificial. Can any other principle be right?

In the very beginning of germination, nature beings to cover, insulate and protect, with an *elastic* film, skin or membrane, the life germ. This law prevails through the whole line of plant and animal life, from a grain of wheat up to a mastodon. Puncture this protecting skin or membrane and there immediately ensues decomposition (or corrosion) in the exposed flesh. So long as the plant or animal lives, whether one or a hundred years, this yielding membrane perfectly protects. We ourselves take the tough hide and the fine elastic skin of animals to protect our feet and waterproof our hands, both our own and the artificial protection readily yielding to every move of the foot or hand.

If a chicken came forth in a coating of soap and slum, his usefulness would end with his appearance. Nor do we waterproof our feet or our hands by immersing them in a bath of cement, which would make them set, rigid and useless. Yet, is this not essentially what we do when we would protect and waterproof our structures, which must settle, contract, expand and *move*, with an injection of hardening fluid to embalm them, thus preventing instead of providing for the natural functions of the masonry or concrete, and also imperilling both the waterproofness and the usefulness of the structure?

Obviously, therefore, a *natural* waterproofing is one which, skin, hide, or membrane-like, yields to the natural contraction and expansion of the structure, and protects it by *preventing water from reaching it*.

Believing in this theory, the speaker has tried to prove it, not dogmatically, but rather by inference through natural illustrations, which usually are more convincing than a mere statement of belief. The comparative newness of the subject, the lack of general knowledge concerning it, and the wide belief in the profession that concrete, especially if steel reinforced, or more concrete is added thereto, is waterproof, is also some extenuation for making illustrations of natural facts, supposed to be common knowledge.

If, therefore, the skin or membrane theory is logical, natural and right, it then simply remains to develop that theory and to scientifically perfect the materials necessary for its practical success.

Considered in this light, *i. e.*, following the membrane idea, and coming down to the actual work of preventing water from reaching the structure, we would submit the following observations and rules:

PRACTICAL APPLICATION OF WATERPROOFING.

FIRST: No waterproofing, especially for difficult and waterpressure work, should be undertaken when the temperature is below 25° F.

Fifty per cent. better work can be done when the weather is warm. In cold weather the felt sheets are difficult to handle, the hot bitumen-cement chills and congeals too quickly, especially when it comes in contact with a cold wall, and it is difficult to obtain the perfect cohesion of the different felt layers.

SECOND: Allow sufficient time, room and accommodations in which to properly apply the materials.

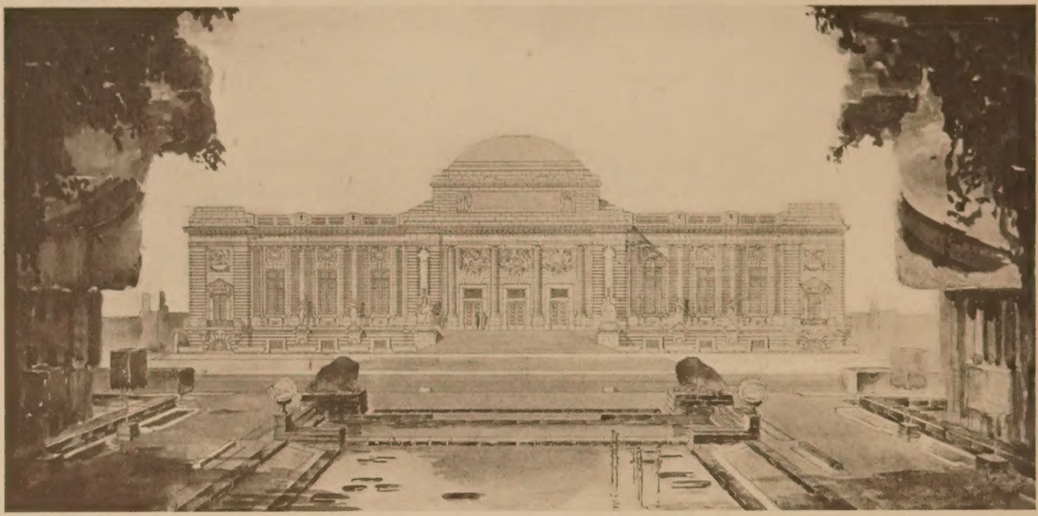
The reverse of this rule, however, is the common practice. No other part of construction work depends more upon the perfection of details than waterproofing. Yet there is no part of such work which receives so little appreciation and consideration. To not make every provision for facilitating waterproofing work is a great mistake. No matter how conscientious a workman may be, he cannot, for example, do good work on a wall, from the outside, if the excavation is not wide enough from the wall to give him room in which to work, or on the inside of the wall if he has scarcely light or arm room, and is crowded upon by workers in brick, in cement, in stone, in steel, etc., etc.; nor on the roof of a subway, under railway tracks, if there is not sufficient head and working room between the roof of the subway and the base of the tracks, etc., etc. This lack of consideration, in not providing time, room, and the necessary facilities, and in allowing contractors to apply the materials in any haphazard way, so long as the materials are applied, is the real cause of so many past failures. Nothing pays better than good waterproofing, and nothing is more disastrous than poor waterproofing. Once water gets behind waterproofing, no waterproofing would have been preferable.

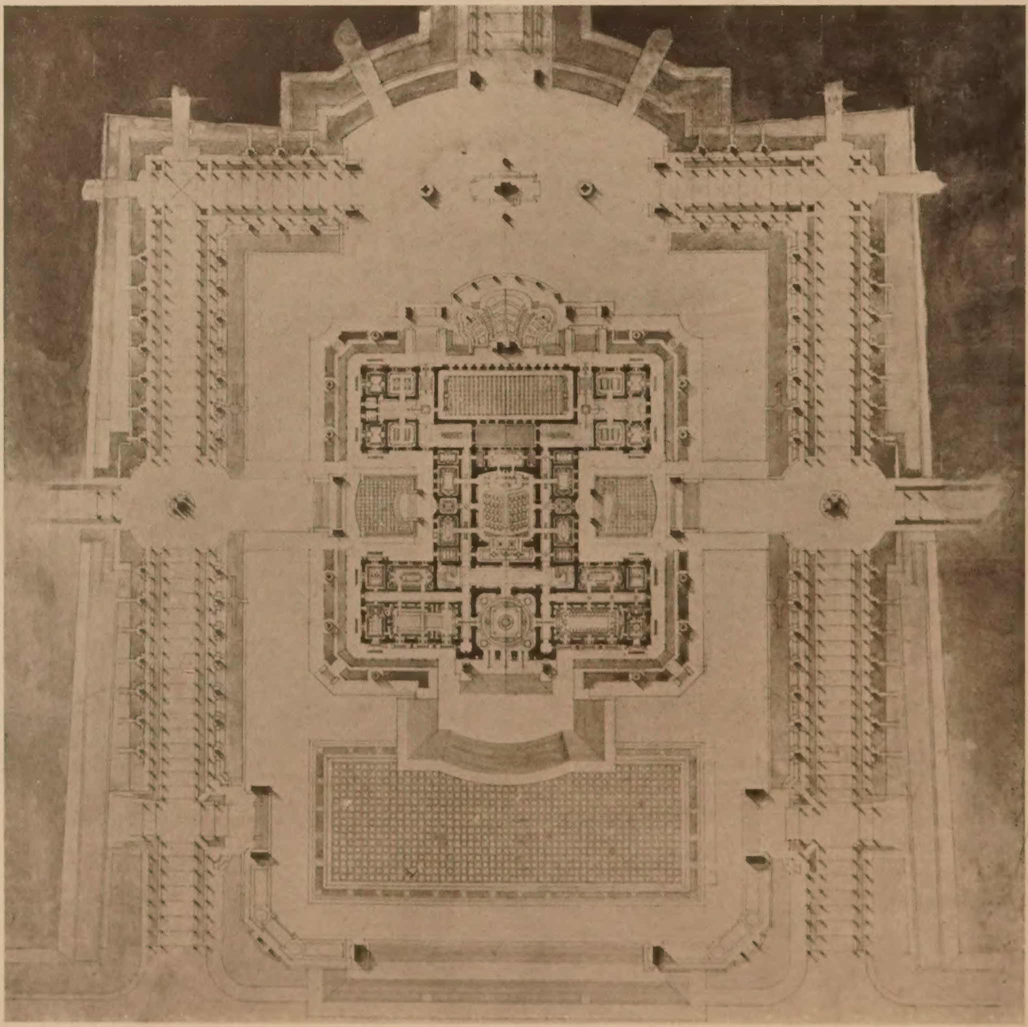
THIRD: Design the structure to properly receive waterproofing.

The design will either make impossible proper waterproofing, or will invalidate the best materials after they are in place. The line-of-waterproofing should be adapted to the nature and purpose of the structure and be logical with the point of waterpressure.

As an example of a faulty design, there is submitted the following sketch, frequently used in trade pamphlets of waterproofing materials. It has, in fact, been adopted in the Department of Buildings in one of our largest cities, and shows how easy it is to officially endorse and follow a bad principle.

(Continued page 27)





BEAUX ARTS COMPETITION—PEACE PALACE AT THE HAGUE. II Medal. C. Edgar Cope, Atelier Cret.

(Continued from page 25)

FOURTH: Specify always that the waterproofing shall be done only by experienced and skilled labor.

Roofing, for instance, is not waterproofing. An excellent example of this is shown in the following photograph of "waterproofing" applied to the back of a retaining wall. The contractor, a roofer, was so proud of his work that he had the picture taken to illustrate it. It requires no trained eye to see that the surface of the retaining wall is, in the first place, too rough, and is not rightly smoothed, to waterproof. That the corners of the wall and the edges of the steps are round and badly broken, instead of being neat and square, making it almost impossible to fit the layers of felt around same. The waterproofing itself is slovenly and irregularly applied, underlaid with air pockets, not properly lapped, or smooth and tight. No skilled waterproofer woúld, at the outset, have applied the materials to such a surface. He would have refrained from doing so until the surface was properly prepared. This is also the case where possibly the engineer did not himself know—but engineers cannot be expected to know all things.

FIFTH: Thoroughly protect the waterproofing during and after application.

The average laborer is no respecter of waterproofing, especially an elastic waterproofing, and will walk on same, roll wheelbarrows over it, throw tools, lumber, brick, stones, cement and debris theron, to its serious damage.

After arches are waterproofed, it is a common mistake in placing the fill, to not begin same at the base of the arch, but to dump the fill on the crown. The fill thus often breaks through the brick or cement protection on the waterproofing, and tears or strips the waterproofing from the arch surface. It is false economy to not always permanently protect waterproofing with a layer of brick or cement mortar.

SIXTH: Inspect waterproofing at all times during application.

See that the materials as specified are used, and also that they are themselves up to standard; that the work is done carefully and skillfully, particularly in the out-of the-way small difficult places; that the laps are not made 22 inches when they should be 24 inches; that the hot cementing material is applied not one-fourth or one-half, but the entire width of the lap; and that it is applied *hot,* quickly and thoroughly; that full, clean and well protected connections and provided; that the waterproofing is well protected at the end of the day's work; that no work is done except in the presence, and by the approval of, the special inspector appointed over the work.

If the inspector is himself not thoroughly skilled in waterproofing, he is of no value. He might be an expert in steel or cement, or caisson work, but without the right experience in, and the knowledge of, waterproofing, the waterproofing men under him could easily deceive him in important details of the very thing which is to make permanently safe and valuable the steel and cement. If the waterproofing is very important, expert direction and supervision should be obtained.

SEVENTH: Do not depend on guarantees.

The speaker has always contended that a waterproofing guarantee is practically worthless. A roofing guarantee is of value, because the conditions are entirely different. In roofing, the cause of, and responsibility for leaks, can be easily settled. Seldom, however, is there any recovery had under a waterproofing guarantee. Bonding companies are averse to supporting waterproofing guarantees because of the high risk. It will be found, on close analysis, that bonded guarantees do not, in fact, guarantee. Such, for example, is a bonded guarantee reading, that the structure or surface to which the waterproofing is applied, must remain "sound and stable."

The very purpose of waterproofing is to waterproof the structure or surface in the event of their *not* remaining "sound and stable." Such a guarantee, of course, means nothing, except that the bonding or other company assumes no risk, but shifts it to the owner of the structure, who himself then guarantees that his structure or wall will not crack or injure the waterproofing. The waterproofing should accommodate itself to the wall, instead of the wall accommodating itself to the waterproofing. The best guarantee is work, intelligently, skillfully and honestly executed by a concern of reliability and reputation.

A strong case in point is a recent decision on a waterproofing guarantee by the United States Circuit Court of Appeals, Third Circuit, 144, Federal Report 942. In a contract for the foundation of a building, the specifications, after describing the waterproofing materials to be used, stated: "The whole to be made perfectly watertight and guaranteed." On the completion of the foundation it leaked and payment was withheld from the contractor. The contractor contended that he had strictly followed the specifications, and was not accountable for the result of the plans. The Court upheld the claim of the contractor.

EIGHTH: Do not use a set or standard specification.

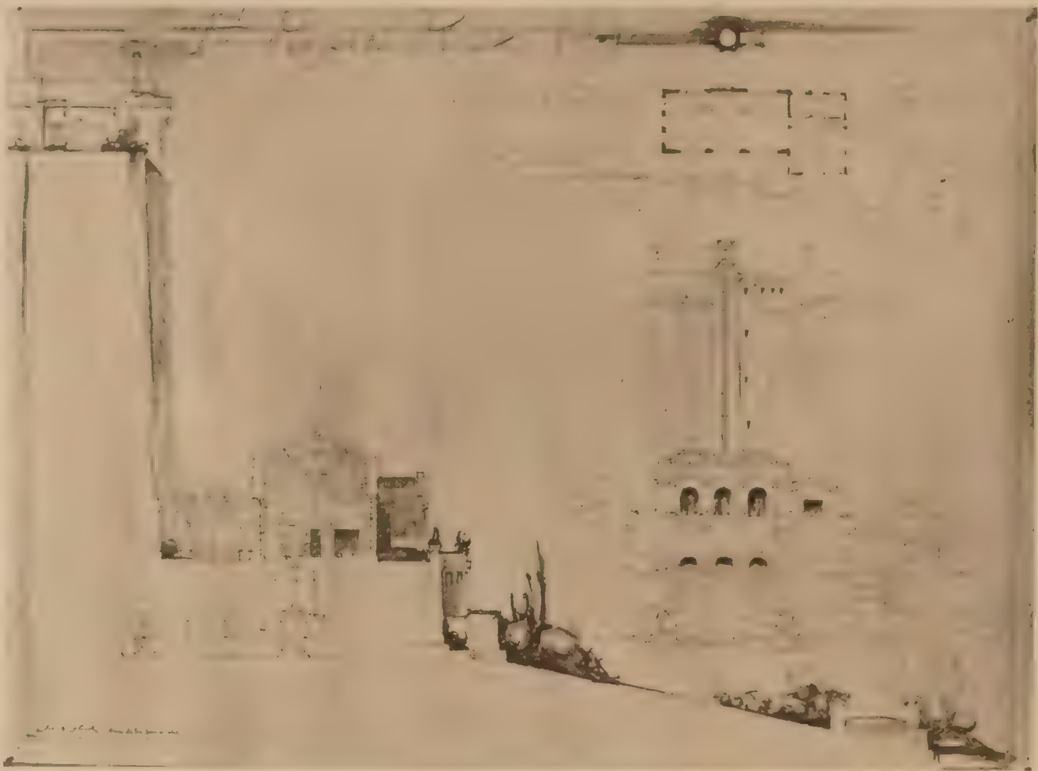
Each design must suit the exact conditions, and each specification must exactly suit the design. Using a set or standard specification frequently offsets the very purpose desired. It results in the customary but very serious mistake of placing the waterproofing details on the contractor. A contractor will apply anything that is specified, and, as a rule, is interested only in getting it applied as quickly as possible. Speed in waterproofing is undesirable and dangerous. The specification as to waterproofing, particularly in important work, should be clear and to the point in every detail. It should make the contractor responsible only for the proper application of the materials under the close observation and approval of the Engineer.

In the final analysis, the sanitariness, soundness, safety, preservation, usefulness, symmetry and beauty of any structure, depends upon protecting it against the destructive action of moisture.

N. B.—After this paper was sent to your Society to be approved by your Publication Committee, the speaker received a very polite note from your Secretary suggesting that the introductory part of the paper be condensed a little so as to get sooner to the "experience and facts" recited in the following portion of the paper. Adopting the suggestion one section was cut out. Will you permit the query, however, if one of the mistakes of the day is not seeking a short cut to the facts without regard to whether the fact has any substance or basis of truth? A fact may not be the truth, whereas the truth is always a fact. It is fully realized that engineers of all professional men, are eminently practical; that engineering is an exact science; that if a line is not straight, true and exact —the line is not true. Heretofore, facts based on "experience" in waterproofing have been of little service because of the comparative newness of the subject. It, therefore, seemed necessary to go back to find some established physical law or truth as a basis and work up from it.

The speaker feels that his attempt to briefly do so has, by a strange coincidence, found support in a paper contained in the "New York Herald" of Sun-

(Continued page 29)



I Prize. F. Jonen, Atelier Hornbostel.

II Prize. W. S. Wagner, Atelier Hornbostel.

BEAUX ARTS COMPETITION—THE PUPIN PRIZE.

(Continued from page 27)

day, the 18th inst., which we read as we were starting west to attend this meeting. The article, which covers a half page, illustrated, is entitled: "Steam bursting under ocean bed cause of earthquakes. Water seeping through earth's crust formed into power that crumbles rock. Is proved by eruptions. Steam raises mountains and plateaus. 999 out of 1,000 parts issuing from volcanic craters steam." The paper is by Prof T. J. See, in charge of the Naval Observatory at Mare Island, also Professor of Mathematics in the Navy, and is taken from a lecture before Leland Stanford University on the 15th inst. It is also part of a memoir of some 200 pages to the American Philosophical Society at Philadelphia, in which he has exhaustively examined the most important phenomena connected with the phys'cs of the earth. In it he refers to the porosity of rock, stone, i·on and steel. He refers to such learned investigators as Scrabo, Prof. Milne, Sir Archibald Geikie and the veteran French geologist, Daubree, etc., etc. The speaker believes that your perusal of this memoir will be both interesting and profitable.

GIRDER WIND BRACING.

IN the twenty-two story building erected for the United States Express Company, in New York, a somewhat unusual form of wind bracing was adopted by Col. Wells, the structural engineer. In this case the building is surrounded by low houses, and no account was taken of the protection which they afford from the wind, the wind pressure being estimated at 30 lbs. per square foot over the entire surfaces of the building down to the street level. To provide for resisting the stresses in the framework, double lines of continuous main girders were disposed perpendicular to the street fronts. These twin girders engage the columns on opposite faces, and the connections between them and the columns are made with deep plates riveted across the faces of the columns, and serving both as connection plates and as braces against wind stresses. In addition to providing for wind stresses, this type of girder strengthens the building so as to obviate the necessity of knee-braces, diagonal rods, portals, and other systems of bracing which require special members or difficult connections, and obstruct the interior of the building. The form of wind bracing here applied has the further advantage of avoiding tension in the rivet heads and of transmitting the stress entirely through direct rivet shear. Consequently, it is economical both in construction and erection. More rivets are certainly required than in some other methods of bracing, but on the other hand they are all in accessible positions, and the columns and girders can be very readily assembled and connected during erection.

The Society of Beaux Arts Architects

INCORPORATED 1894.

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OFFICIAL ORGAN - - ARCHITECTURE.

CLASS A—PLAN PPOBLEM.

THE PEACE PALACE AT THE HAGUE.

The building shall be composed of:

A COURT HOUSE.

BASEMENT STORY.

1. Dwelling of the concierge, containing four rooms and kitchen, etc., directly accessible from the Park and communicating with the different stories by a servants' staircase (escalier de service).
2. Two spare-rooms, sufficiently light and communicating with each other.
3. A place for the caloriferes with fuel-store.
4. A room for the stenographers. Further, as far as the available space and the construction will allow, wardrobes, lavatories, etc., servants' rooms, waiting rooms and store-rooms.

PRINCIPAL STORY.

The floor of the principal story must not be more than 2.50 M above the exterior ground.

1. Great hall with main staircase.
2. Staircase leading to the basement story.
3. Doorkeeper's room.
4. Large Court of Justice, 280 to 300 M, with or without an ante-room, with a removable podium and a gallery either along a side wall or at the end.
5. Small Court of Justice, 140 to 150 M.
6. Adjoining each Court of Justice a council room, each 40 to 45 M, with waiting room, wardrobe, lavatory, etc. (If the council rooms are close together, one waiting room, lavatory and wardrobe for both will be sufficient).
7. Two rooms for the parties in the case, each 40 to 45 M.
8. A chancery room, 40 to 45 M, with a vaulted safe (2 x 2 M) and booklift to the upper story. Messenger rooms, wardrobes, lavatories, etc. The council rooms shall have each a separate or together one joint exit to the Park, either directly or through the basement story.

UPPER STORY.

1. A room for the Counseil Administratif of the Permament Court of Arbitration, 90 M. (a council room for 30 to 35 persons around a table) with an ante-room and a president's room, 20 to 25 M.
2. A room for the general secretary, 40 to 45 M, with a waiting room and lavatory, etc., 15 to 20 M.
3. Two secretaries' rooms, each 25 to 40 M, with one joint waiting room and lavatory, etc.
4. Two rooms for clerks, each 20 to 35 M.
5. One room or two communicating rooms for archives, together 80 M.
6. Four study rooms, each 20 to 25 M.
   Messenger rooms, wardrobes, lavatories, etc.

B. LIBRARY.

The Library must be built so as to form a separate part of the Peace Palace, with its own main entrance from the Park and an interior communication with the Court House on the principal story.

BASEMENT STORY.

1. Dwelling of the concierge, containing four rooms and kitchen, etc., directly accessible from the Park and communicating with the different stories by a servants' staircase (escalier de service).
2. Store-rooms and packing rooms.
3. Bookbinder workshop.
4. Place for the caloriferes with fuel-store.
5. Spare rooms.

PRINCIPAL STORY.

The floor of the principal story must not be more than 2.50 M above the exterior ground.

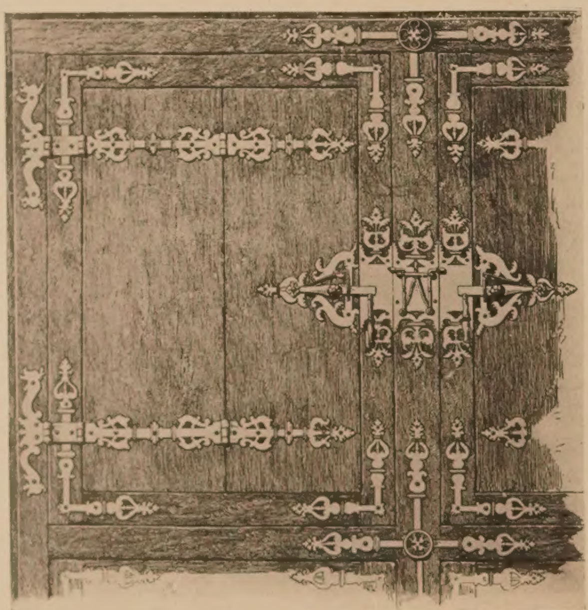
(Continued page 32)

THE SCHOOLS OF ORNAMENT.*

Flemish Renaissance.

1500-1600. The name comes from the ancient countship of Flanders, now partitioned among Holland, Belgium and France. The inhabitants were nearly allied to the Dutch in origin and speech. Cornelius and Francis Floris, Peter Neef and other architects, painters and sculptors.

THE Renaissance was taken up in Flanders with evident delight, if we can judge of the excellent work produced there by the masters of design. There is much in it like the Elizabethan, but a greater delicacy and appreciation of refined lines and curves, emphasized by a sudden enlargement into a leaf or flower of a relief much increased over that of the stem. The result is a glittering succession of varying high lights, which at once attracts attention, and charms the eye by the wonderful skill shown in the execution. There is in the designs of Hans Holbein a pronounced Flemish quality, as also in some of the carvings of the period of Francis I. Its coarser characteristics are seen in Elizabethan cartouches and panels where the faucetted faces of round or square projections most effectively



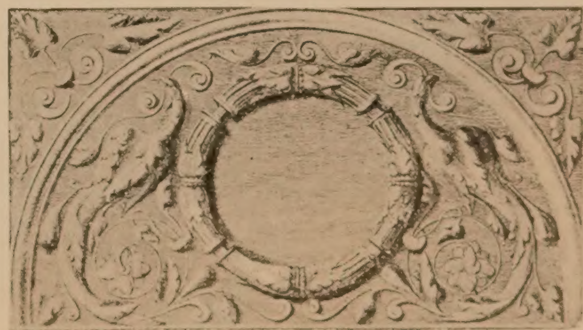
Detail of Shutters at Bruxelles.

come into play. Boldness of contrast is the quality which it most constantly preaches, and in the choice of ornament the school, like many others, is at times eclectic.

We note helmeted heads often in profile, and grotesques on console and cartouche and arabesque. Paneling is much relied upon, and upon pilasters and split colonette is applied,

Detail of Screen, Dortrecht.

emphasized by bosses in various forms. Spanish art is to be likened to Flemish in the great and skillful use of the lathe everywhere apparent. Fret work, enriched with bosses and



Spandrel at Kampen.

From Hotel de Ville, Audenarde.

* A series of articles written by Mr. William Winthrop Kent, Architect, forming part of "A Treatise on Locks and Builders' Hardware," by Henry R. Towne, President of the Yale & Towne Mfg. Co., and Past President of the American Society of Mechanical Engineers. This book is profusely illustrated and contains more than 1100 pages, 4x6½". John Wiley & Sons, Publishers. Price, $3.00. It is the intention of the publishers of ARCHITECTURE to reprint one school in each number.

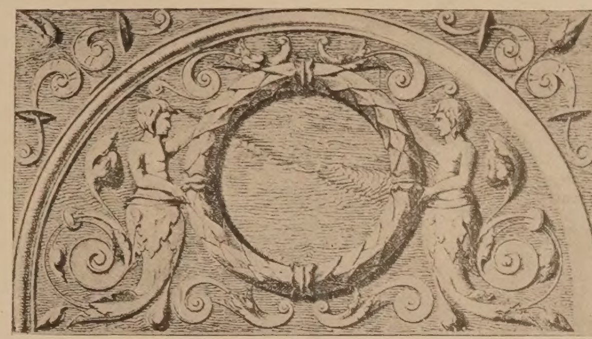
faceted forms, is applied to the faces of plain colonettes and pilasters with carving on or accessory to it, put in such places as to command admiration rather than criticism, while the carvings themselves are full of a sense of the round. In early work Gothic influence is apparent in cabinet, chair and interior woodwork most powerfully carved.

Details of Choir Stalls at Dortrecht.

Cornelius Floris built the town hall at Antwerp in 1576, one of the best examples of Flemish, and his brother Francis, the Raphael of Flanders, designed the memorial arches upon the entry of Charles V into that city.

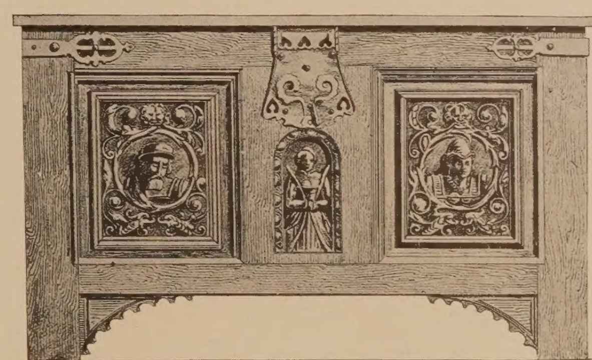
Flemish designers worked with an evident appreciation of the beauty of Italian art, and as we have already said, a strong Spanish influence derived through the Dutch association with Spanish rule or misrule is noticeable, the turned balusters, columns and colonettes in particular showing the abrupt and emphatic flare at frequent intervals, which is so telling in the designs of the best period in Spain. But one of the most noticeable and beautiful characteristics of Flemish carving is the delicacy and contrast so skillfully dwelt upon in the

Details of Choir Stalls at Dortrecht



Spandrel at Kampen.

work of the leading craftsmen in the golden age of Flemish art. It is like Jean Goujon's work on chest and coffer as we see it in Azay-le-Rideau, and in other private and public collection. It irresistibly attracts attention and commands admiration, and is a most instructive style for the wood carver to study, inasmuch as the Flemish carvers have never been surpassed in the telling brilliancy of the high lights in most of their work.



Chest at Nymeque.

(Continued from page 29)

1. Doorkeeper's room.
2. The library, where the books are stored, 500 M, fireproof, (10000 M bookshelves in five stories) lighted by windows from at least two opposite sides.
3. Two reading rooms, each 60 M.
4. Adjoining an office-room for the distribution of the books, 40 to 45 M.
5. Two rooms for the librarian and sub-librarian, each 40 to 45 M.
6. A waiting-room, 20 M.
7. Two rooms for clerks, each 25 M.
8. A room for geographical maps, 60 M.
9. A cataloguing room, 60 M.
   Messenger rooms, wardrobes, lavatories, etc.

UPPER STORY.

1. A room for the Board of Directors of the Carnegie Foundation, 40 M.
   with a waiting room, 30 M.
2. A chancery room, 40 M.
3. Spare rooms. Messenger rooms, wardrobes, lavatories, etc.

The dimensions of the ground space are not limited, but the competitors must not exceed, for any of the rooms, the measurements prescribed.

The sketch shall consist of a plan and section at 1-32″ with an elevation at 1-16″.

For the rendu there shall be given a plan and elevation at 1-8″ with a section at 1-16″.

REPORT OF JUDGMENT.

Feirer, F. J.	New York	Atelier Hornbostel	Mention
Lehmann	New York	Atelier Hornbostel	
Ewald, R.	New York	Atelier Barber	
Cope, C. E.	Philadelphia	Atelier Cret	2d Medal
Dorsey, L. M.	Philadelphia	Atelier Cret	Mention
Smith, A. T.	Philadelphia	Atelier Cret	Mention
Elliott, T. H.	Philadelphia	Atelier Cret	Mention
Schwebel, E. J.	Philadelphia	Atelier Cret	Mention
Dickhus, R. M.	Philadelphia	Atelier Cret	Mention

PUPIN PRIZE.

A power station at the foot of a cliff, where electricity is to be generated by water power. The profile of the site is as follows:

A perpendicular cliff 120 ft. high at the foot of which there is a level plot 80 ft. wide, then a vertical retaining wall of 30 ft., and from the foot of this wall a public park 150 ft. wide, having a slope of 40 ft. to the river. The total height, therefore, is 190 ft. from the edge of the cliff to the level of the river. The dimension of the grounds parallel with the river is unrestricted.

The requirements are: A standpipe 10 ft. in diameter, conveying the water from the top of the river to three turbines running the electric generators. These generators are to be housed in a suitable building on the 80-ft. plot at the foot of the cliff. This power house is to have proper place for switchboard for machine and repair shop, for a small manager's office, and office for engineer. It is to be supplied with a travelling crane so as to handle machinery. The power wires are to be carried up on the outside of the standpipe and distributed from a small pavilion or pole placed on top of the standpipe. The standpipe can be of metal covered with masonry or of reinforced concrete.

For information as regards to placing the turbines and electric generators, the inlet and outlet of water, see pictures of the Niagara Power Plants as illustrated in the *Scientific American*.

The drawings are: A section at 1-8″ scale, one elevation and one plan at 16″ scale. All to be placed on one sheet of paper.

REPORT OF JUDGMENT.

Varian, L. E.	New York	Atelier Barber	
Arneman, E.	New York	Atelier Hornbostel	
Adams, C. C	New York	Atelier G. B. Post	
Witt, F.	New York	Atelier Hornbostel	
Lange, J. A.	New York	Atelier Barber	
Ramberg, O. J.	New York	Atelier Barber	
Palleson, R.	New York	Atelier Jallade-Prevot	
Rothstein, J.	New York	Atelier Hornbostel	
Sholtes, L.	New York	Atelier A. S. G. Taylor	
Hubbard, A. H.	New York	Atelier Hornbostel	
Wagner, W. S.	New York	Atelier Hornbostel	2d Prize
Jonch, F.	New York	Atelier Hornbostel	1st Prize
Lavis, F. A.	New York	Atelier Hornbostel	
Laird, P.	New York	Atelier Beekman	
Cave, W. P.	New York	Atelier Barber	
Norris, W. I.	New York	Atelier Ewing-Chappell	
La Zinck, W.	New York	Atelier Beekman	
Hoelshagen, N. F.	Ithaca	Atelier Cornell University	
Nuliols, F. P.	Ithaca	Atelier Cornell University	
Russell, T. A.	Ithaca	Atelier Cornell University	
Langill, L. E.	Washington	Atelier Washington Arch. Club	